

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



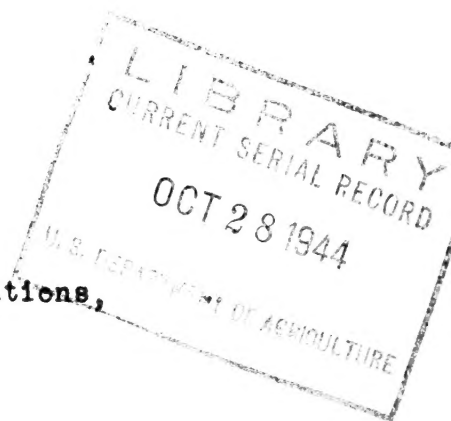
October 1944

ET-219

UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine

INJECTOR FOR FUMIGANTS IN LIQUID FORM

By R. D. Chisholm, Division of Insecticide Investigations,  
and W. C. Fest and A. C. Mason,  
Division of Fruit Insect Investigations



Many devices have been described for the application, for particular purposes, of measured doses of fumigants which are liquids under ordinary conditions of temperature and pressure. This paper describes an injector which has been found to be useful for the injection into corrugated paper cartons of doses of ethylene dichloride ranging in volume from 1 ml. to 21 ml. in steps of 0.5 ml. The cartons contained plant material infested with Japanese beetle larvae.

Description of Apparatus

The injector can best be described by referring to the lettered parts in the drawing (figure 1). The barrel (A) is a piece of extra heavy brass pipe reamed to a convenient uniform diameter and of the desired length. The piston (B) is made from a piece of round brass rod machined to a diameter and to a length which are both slightly less than the diameter of barrel (A). A groove (C) is provided in piston (B) to accommodate a closely fitted packing ring lubricated with graphite. Piston (B) is moved by means of screw (D), the lower end of which is recessed to rotate in split-bushing (E), which is screwed into a hole drilled in the upper end of piston (B). Split-bushing (E) is made from hexagon-shaped brass rod. The rod is halved vertically. The halves are placed together and drilled to accommodate the recessed end of screw (D). With the exception of 1/8 inch, the outside of the halves are then machined and threaded to screw into the hole in piston (B). All parts are fitted closely to reduce lost motion when screw (D) is rotated. Screw (D) extends through a threaded hole in flanged plug (F), which is screwed tightly into the end of barrel (A). A small-bore tube (G) is fitted in flanged plug (H), which is screwed tightly against a paper gasket resting on the lower end of barrel (A). Screw (D) is rotated by means of crank (I). The top of flanged plug (F) is graduated in convenient units. Barrel (A) is provided with a vent (J).

The injector is filled by placing the tip of tube (G) below the surface of the liquid fumigant and rotating screw (D) in a counterclockwise direction. The fumigant is discharged by rotating screw (D) in a clockwise direction. The injector is calibrated by dividing the volume per unit length of barrel by the number of threads per unit length of screw, or by measurement of the volume of fumigant actually discharged during each rotation of the screw.

### Uses for Apparatus

The injector has been found to be suitable for the application of ethylene dichloride for Japanese beetle quarantine purposes. The barrel of the injector used was 5 inches long and had an inside diameter of 1-1/16 inches and a screw with 14 threads per inch. The delivery of ethylene dichloride per rotation of the screw was calculated to be 1.04 ml. Twenty rotations of the screw delivered 21 ml. or an excess of 0.01 ml. per rotation. Fractions of a milliliter are delivered by partial rotation of the screw regulated in reference to the pointed end of the crank and the graduations on the top of the upper flanged plug.

By selecting the proper barrel diameter and screw pitch the injector may be constructed to deliver other measured doses for a variety of purposes such as soil injections.

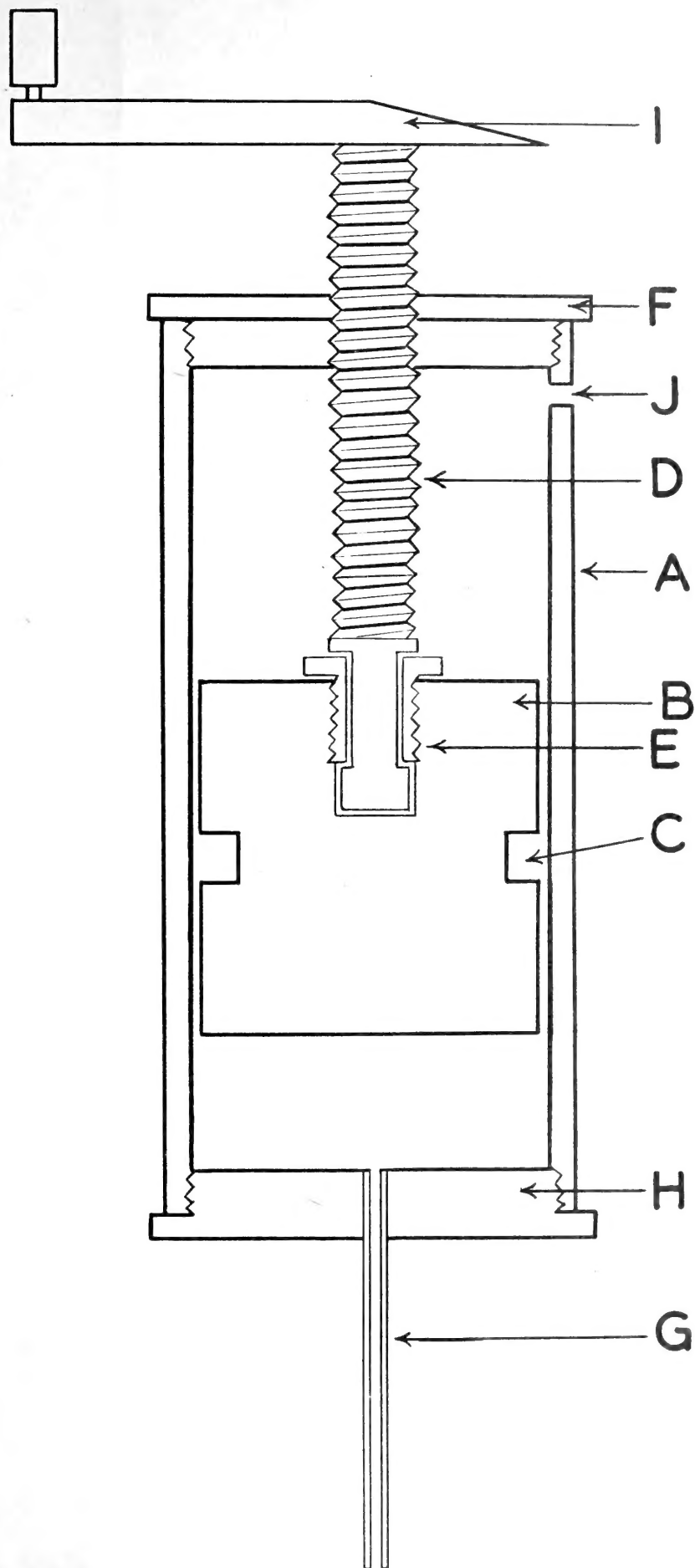


FIGURE 1. DIAGRAM OF INJECTOR

